US009325862B2

(12) **United States Patent**
Nakamura et al.

(10) **Patent No.: US 9,325,862 B2**
(45) **Date of Patent: Apr. 26, 2016**

(54) **SERVER, CLIENT TERMINAL, SYSTEM, AND STORAGE MEDIUM FOR CAPTURING LANDMARKS**

(71) Applicant: **SONY CORPORATION**, Tokyo (JP)

(72) Inventors: **Takatoshi Nakamura**, Kanagawa (JP); **Yoichiro Sako**, Tokyo (JP); **Akira Tange**, Tokyo (JP)

(73) Assignee: **SONY CORPORATION**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 495 days.

(21) Appl. No.: **13/764,044**

(22) Filed: **Feb. 11, 2013**

(65) **Prior Publication Data**

US 2013/0262565 A1 Oct. 3, 2013

(30) **Foreign Application Priority Data**

Mar. 27, 2012 (JP) 2012-071338

(51) **Int. Cl.**

H04N 1/00	(2006.01)
H04L 29/06	(2006.01)
G06F 17/30	(2006.01)
H04W 4/02	(2009.01)

(52) **U.S. Cl.**

CPC ***H04N 1/00183*** (2013.01); ***G06F 17/30241*** (2013.01); ***H04L 67/42*** (2013.01); ***H04N 1/00127*** (2013.01); ***H04N 1/00161*** (2013.01); ***H04W 4/023*** (2013.01)

(58) **Field of Classification Search**

CPC G06F 17/3028; G06F 17/30265; G06F 17/30241; H04N 1/00196; H04N 1/00198; H04N 1/00204; H04N 1/00244; H04N 1/00323; H04N 1/00183; H04N 1/00161; H04N 1/00127

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,301,440	B1 *	10/2001	Bolle	H04N 5/232 348/229.1
7,801,674	B2 *	9/2010	Asai	701/522
8,264,584	B2 *	9/2012	Mukai et al.	348/333.02
8,301,374	B2 *	10/2012	Surampudi et al.	701/438
8,538,164	B2 *	9/2013	Zitnick, III	382/199
8,810,599	B1 *	8/2014	Tseng	345/633

(Continued)

FOREIGN PATENT DOCUMENTS

JP	2002185846 A	*	6/2002
JP	2008-131405		6/2008

OTHER PUBLICATIONS

Hisashi, Yokogawa, "Translation of JP2002185846A", Jun. 28, 2002.*

(Continued)

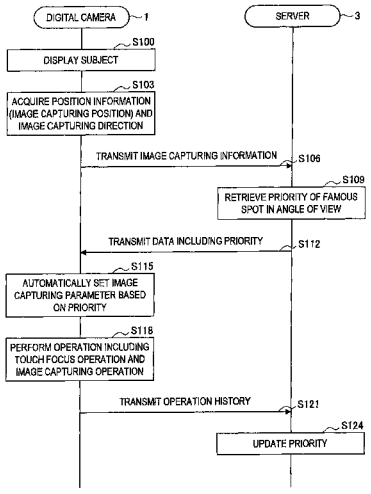
Primary Examiner — Ramy M Osman

(74) *Attorney, Agent, or Firm* — Hazuki International, LLC

(57) **ABSTRACT**

There is provided a server including a database configured to store position information and priority of a landmark, a reception unit configured to receive, from a client terminal, position information of the client terminal, and a transmission unit configured to transmit, to the client terminal, the position information of the landmark corresponding to the position information received by the reception unit, and the priority of the landmark. The reception unit receives position information of a subject captured by the client terminal. Based on the position information of the subject received by the reception unit, the server further includes a control unit configured to perform control in a manner that the priority of the landmark stored in the database is updated.

19 Claims, 8 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

8,817,131	B2 *	8/2014	Sasai	H04N 1/00323 348/231.3
8,890,896	B1 *	11/2014	Tseng	345/633
2005/0172147	A1 *	8/2005	Edwards	H04N 1/00244 726/22
2007/0165968	A1 *	7/2007	Terayoko	382/305
2007/0179705	A1 *	8/2007	Asai	701/200
2009/0033768	A1 *	2/2009	Toyoda	H04N 1/32128 348/231.3
2009/0160970	A1 *	6/2009	Fredlund	H04N 5/232 348/229.1
2009/0289955	A1 *	11/2009	Douris	G06T 11/00 345/630
2010/0149399	A1 *	6/2010	Mukai et al.	348/333.02
2010/0293224	A1 *	11/2010	Moriwaki	709/203
2011/0007901	A1 *	1/2011	Ikeda	H04B 5/02 380/270
2011/0054308	A1 *	3/2011	Cohen	A61B 5/06 600/424
2011/0054791	A1 *	3/2011	Surampudi et al.	701/216
2011/0085025	A1 *	4/2011	Pace	H04N 9/8205 348/49
2011/0123120	A1 *	5/2011	Quack	382/197
2012/0099796	A1 *	4/2012	Zitnick, III	382/199

OTHER PUBLICATIONS

USPTO, "Final Office Action for U.S. Appl. No. 11/961,497", Mar. 17, 2011.*

U.S. Appl. No. 13/748,870, filed Jan. 24, 2013, Nakamura, et al.

* cited by examiner

FIG. 1

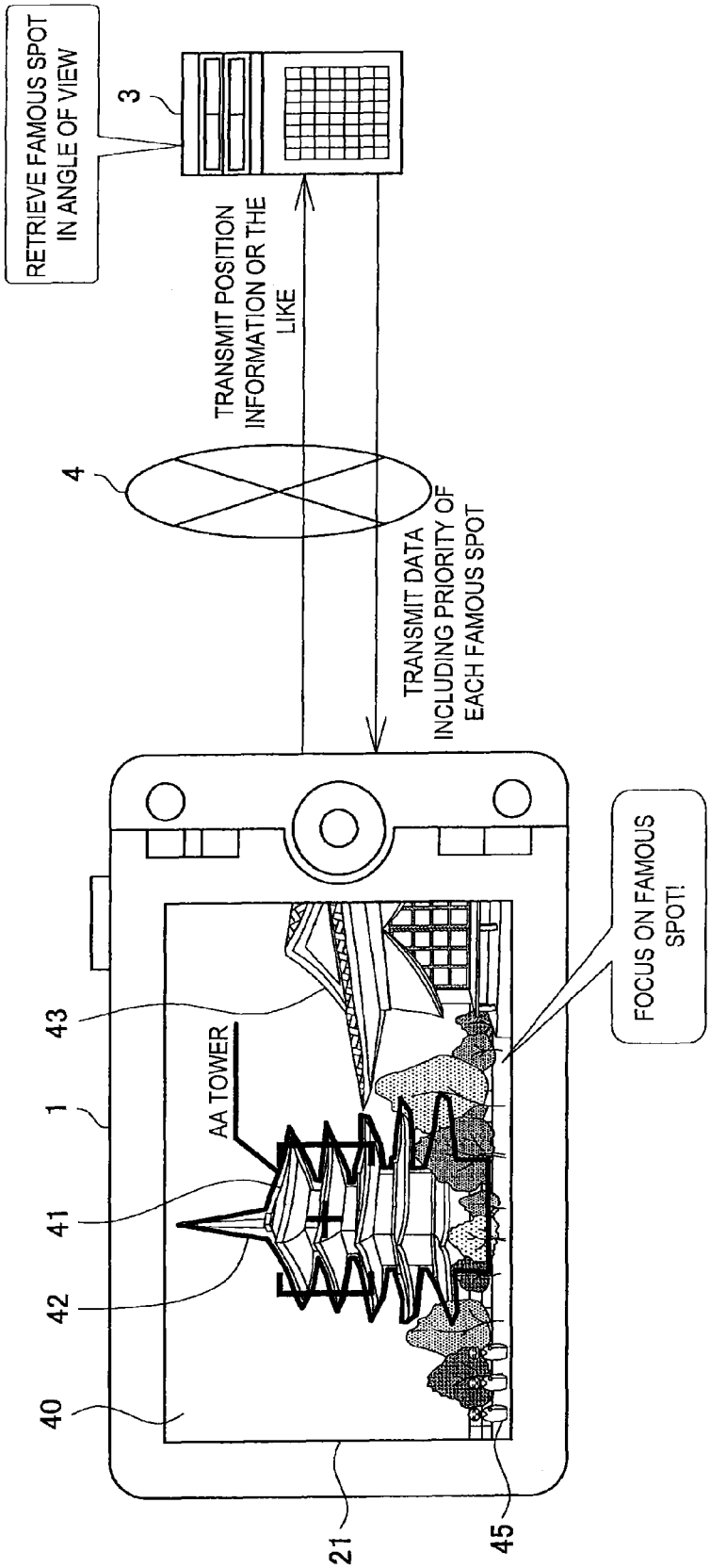

RETRIEVE FAMOUS SPOT IN ANGLE OF VIEW
3
TRANSMIT POSITION INFORMATION OR THE LIKE
4
TRANSMIT DATA INCLUDING PRIORITY OF EACH FAMOUS SPOT
FOCUS ON FAMOUS SPOT!
AA TOWER
43
1
41
42
40
21
45

FIG. 2

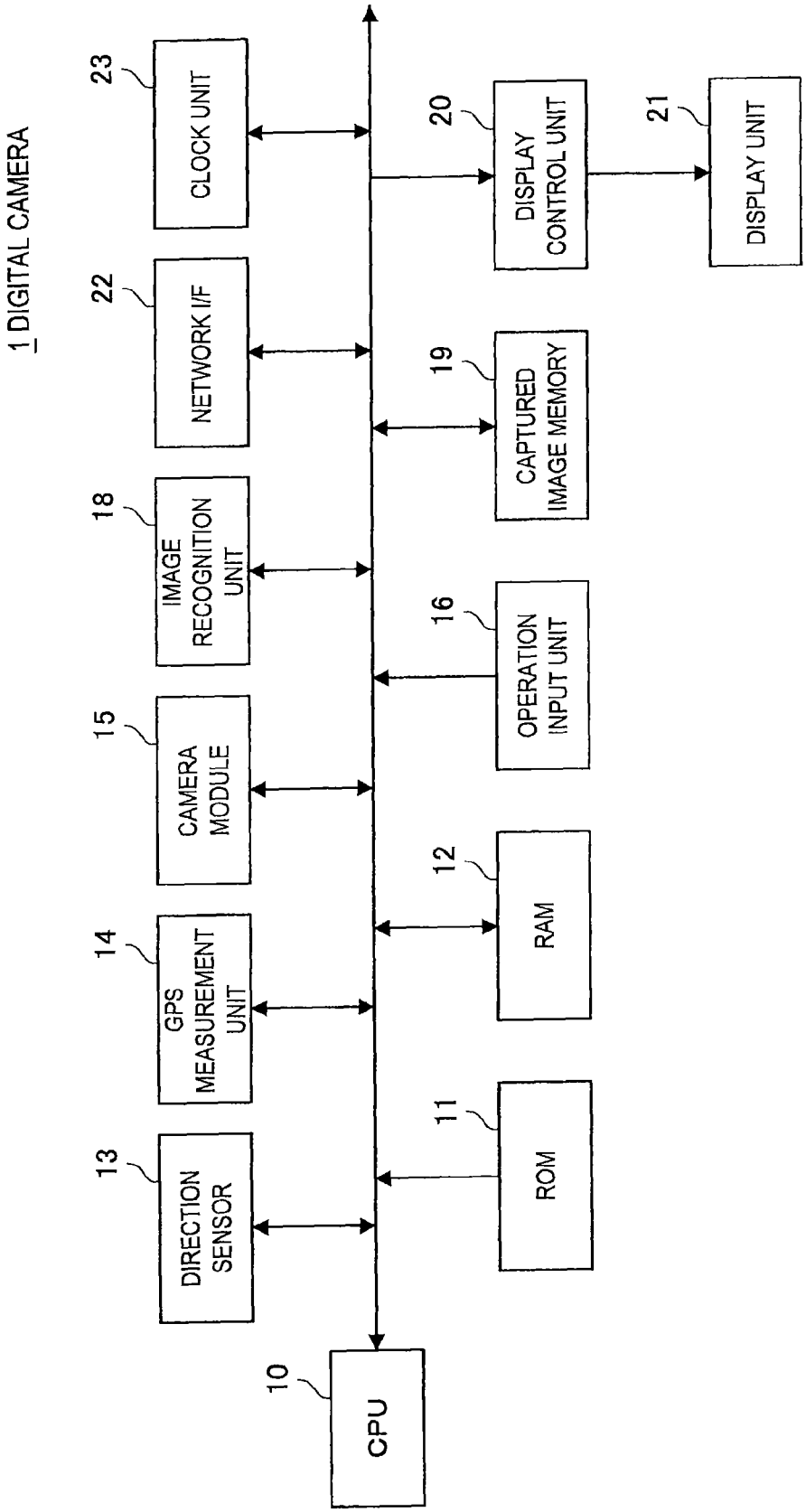

1 DIGITAL CAMERA
CPU
10
ROM
11
RAM
12
DIRECTION SENSOR
13
GPS MEASUREMENT UNIT
14
CAMERA MODULE
15
OPERATION INPUT UNIT
16
IMAGE RECOGNITION UNIT
18
CAPTURED IMAGE MEMORY
19
DISPLAY CONTROL UNIT
20
DISPLAY UNIT
21
NETWORK I/F
22
CLOCK UNIT
23

FIG. 3

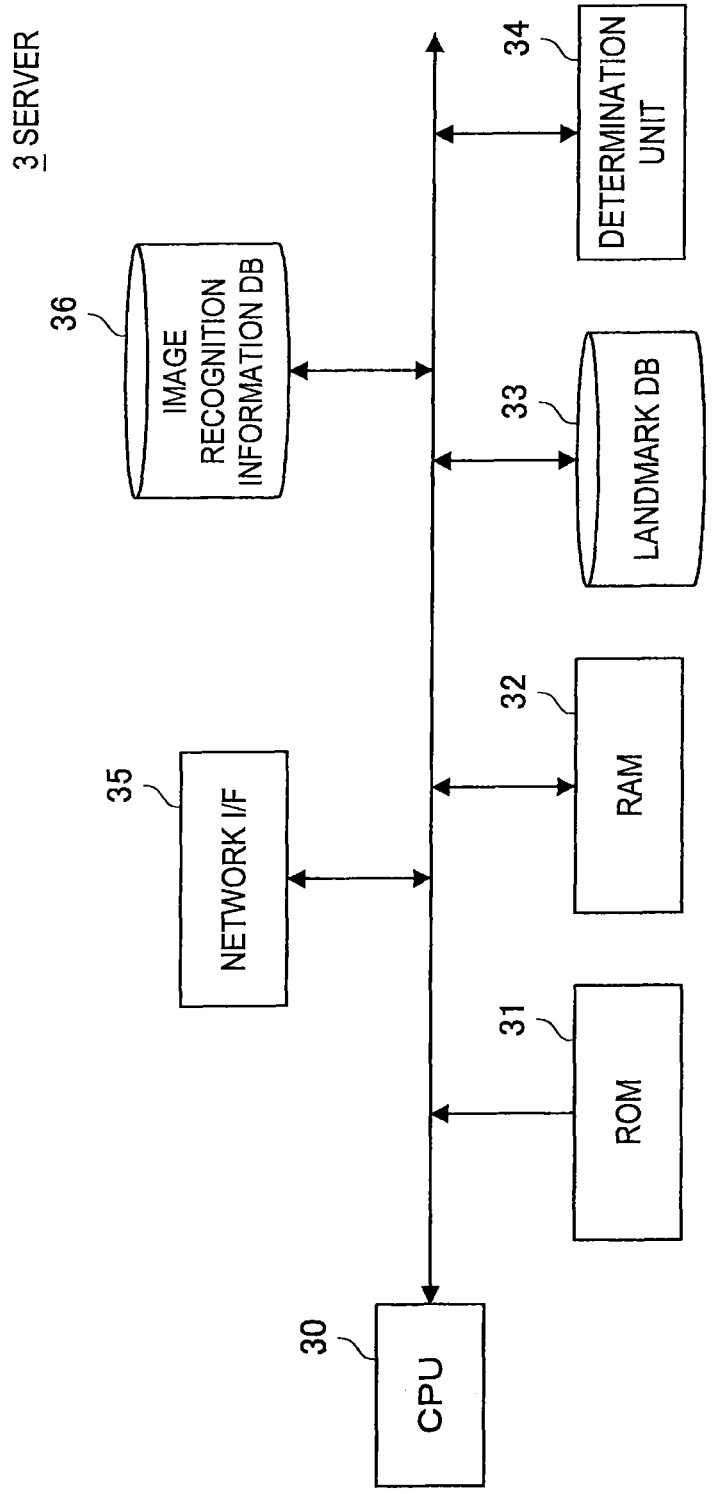
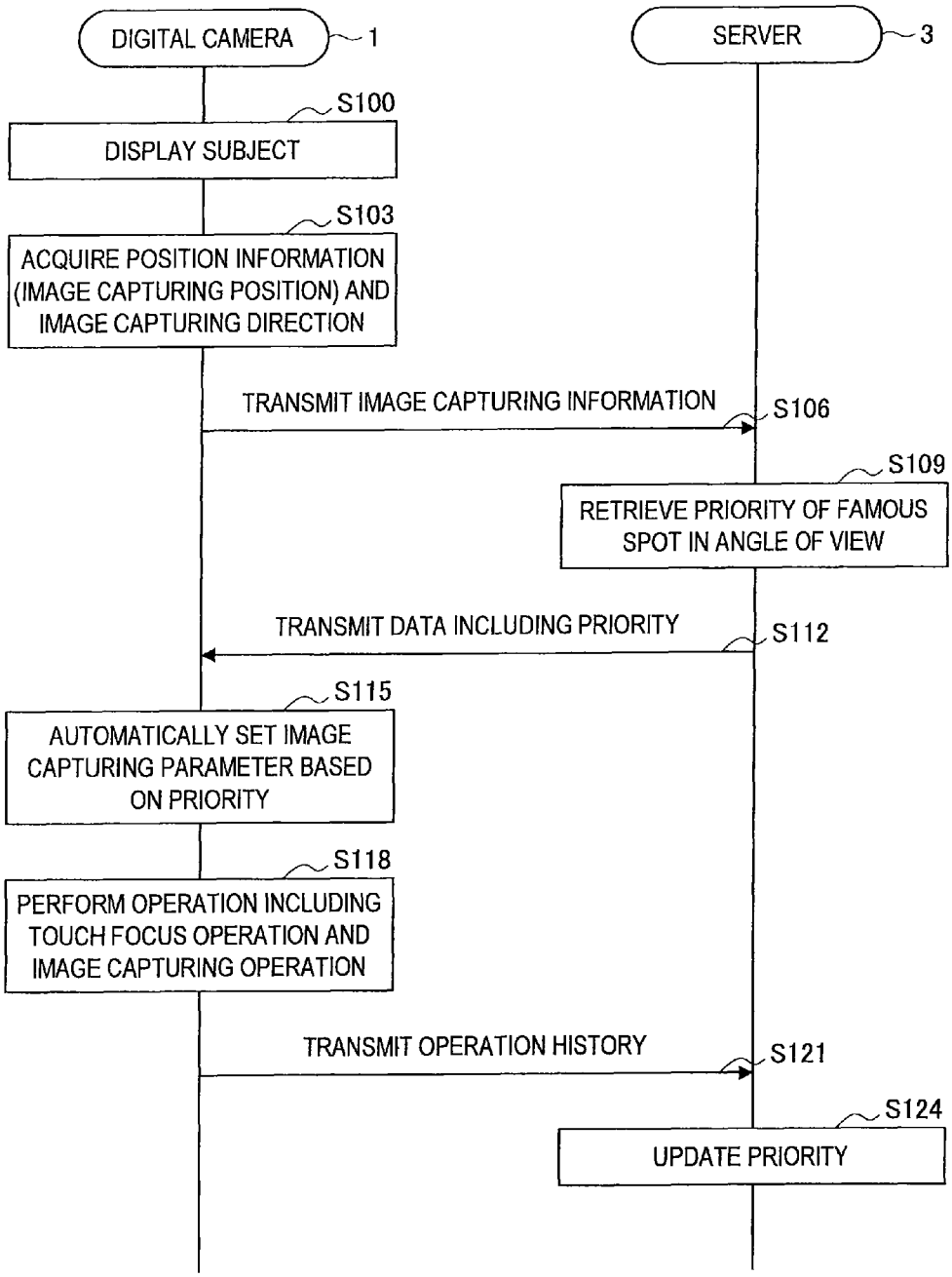

3 SERVER
34
DETERMINATION UNIT
36
IMAGE RECOGNITION INFORMATION DB
33
LANDMARK DB
32
RAM
35
NETWORK I/F
31
ROM
30
CPU

FIG. 4

EXAMPLE OF DATA INCLUDING PRIORITY

LANDMARK	POSITION INFORMATION	PRIORITY	OTHER RELATED LANDMARK	RECOMMENDATION DATA	RELATED INFORMATION
L1	P1	2	L3・・・	13 O'CLOCK TO 17 O'CLOCK...	BB TEMPLE SINCE FEUDAL GOVERNMENT PERIOD...
L2	P2	1	L1・・・	18 O'CLOCK TO 20 O'CLOCK...	AA TOWER BUILT IN 1870...
L3	P3	3	L4・・・	8 O'CLOCK TO 12 O'CLOCK...	CC GUARDIAN DEITIES THEIR SERENE FACES...
L4	・・・	4	・・・	・・・	・・・

FIG. 5


DIGITAL CAMERA
1
SERVER
3
S100
DISPLAY SUBJECT
S103
ACQUIRE POSITION INFORMATION (IMAGE CAPTURING POSITION) AND IMAGE CAPTURING DIRECTION
TRANSMIT IMAGE CAPTURING INFORMATION
S106
S109
RETRIEVE PRIORITY OF FAMOUS SPOT IN ANGLE OF VIEW
TRANSMIT DATA INCLUDING PRIORITY
S112
S115
AUTOMATICALLY SET IMAGE CAPTURING PARAMETER BASED ON PRIORITY
S118
PERFORM OPERATION INCLUDING TOUCH FOCUS OPERATION AND IMAGE CAPTURING OPERATION
TRANSMIT OPERATION HISTORY
S121
S124
UPDATE PRIORITY

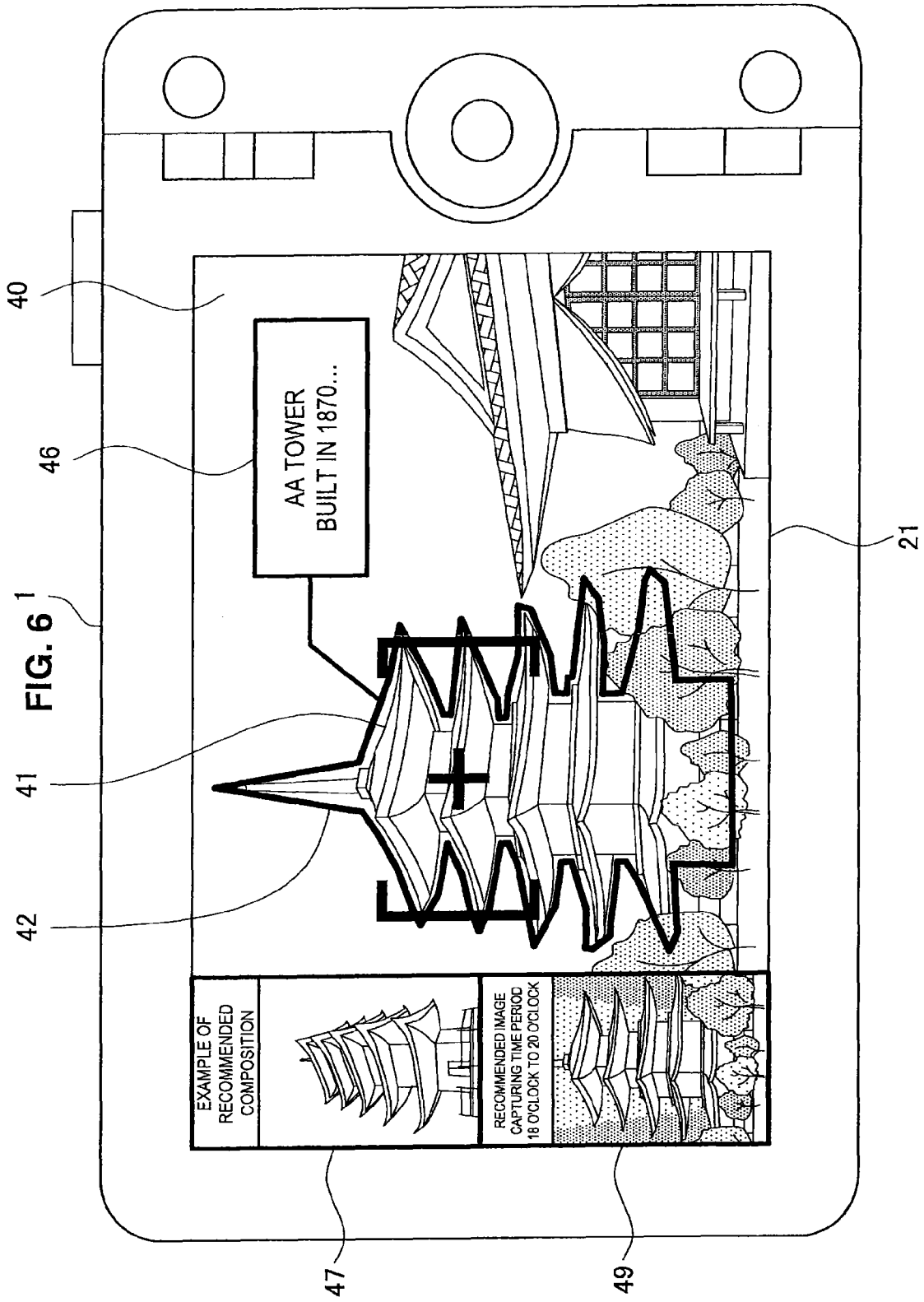

1
40
46
AA TOWER
BUILT IN 1870...
41
42
21
EXAMPLE OF
RECOMMENDED
COMPOSITION
RECOMMENDED IMAGE
CAPTURING TIME PERIOD
18 O'CLOCK TO 20 O'CLOCK
47
49

FIG. 6

FIG. 7

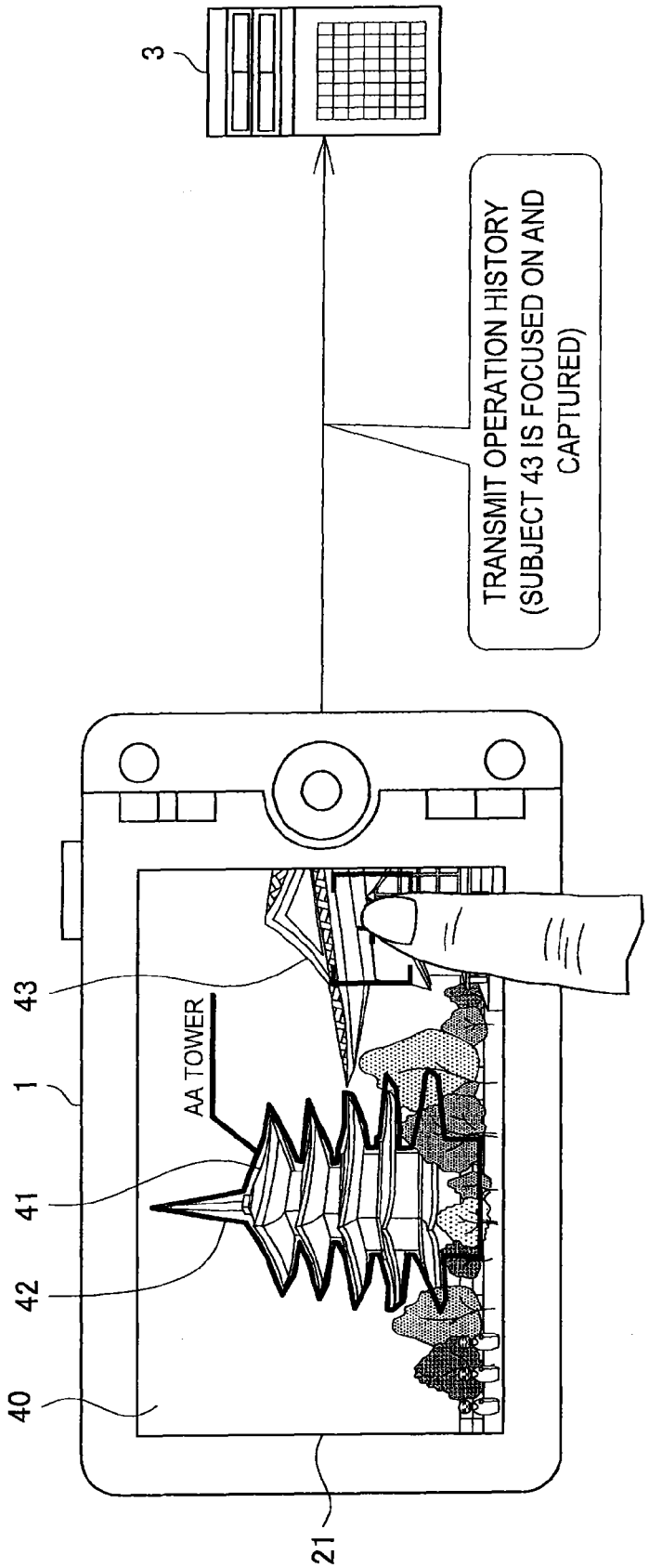
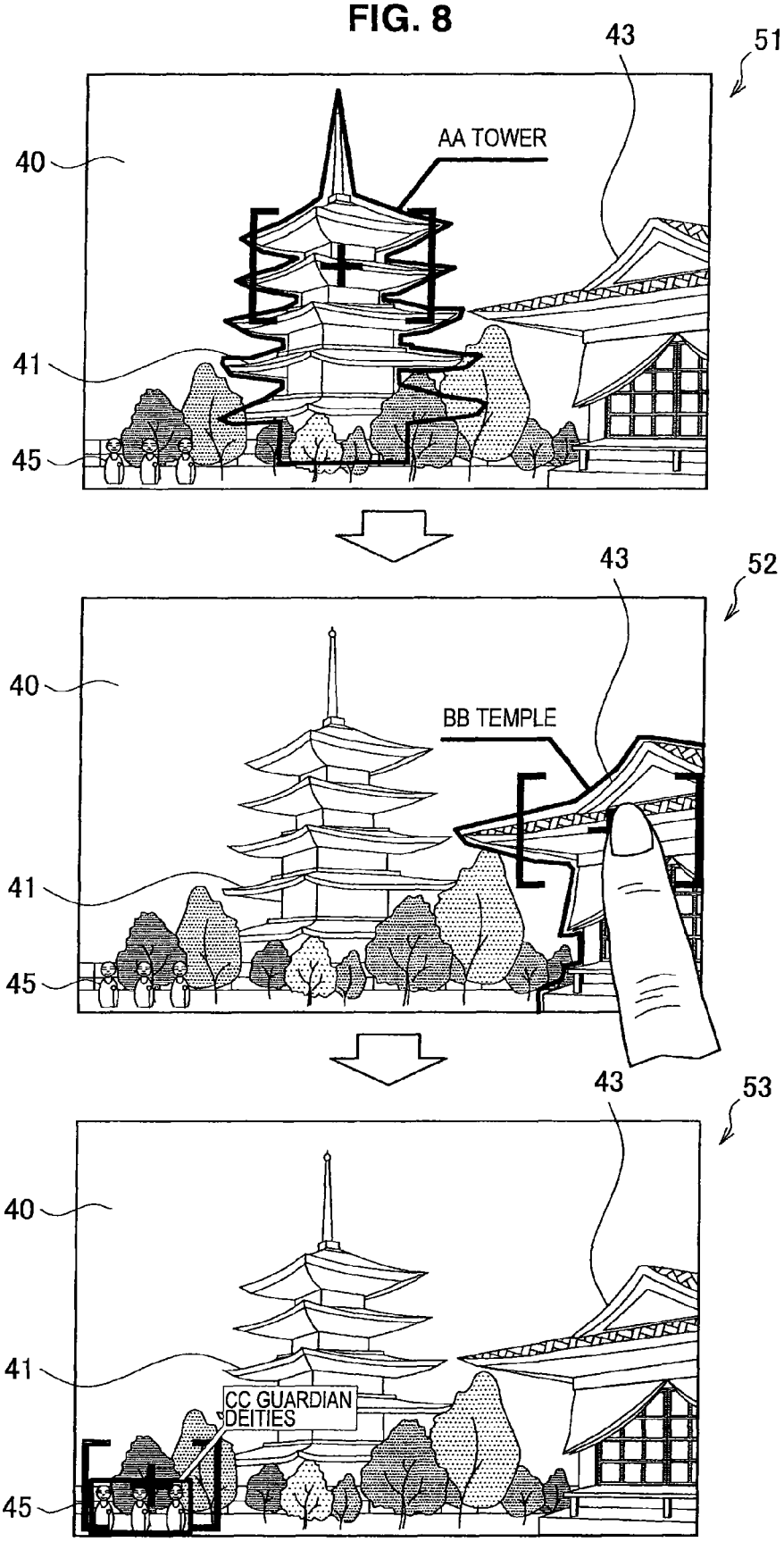

3
TRANSMIT OPERATION HISTORY
(SUBJECT 43 IS FOCUSED ON AND
CAPTURED)
43
1
AA TOWER
41
42
40
21

FIG. 8


43
51
AA TOWER
40
41
45
43
52
40
BB TEMPLE
41
45
43
53
40
41
CC GUARDIAN DEITIES
45

SERVER, CLIENT TERMINAL, SYSTEM, AND STORAGE MEDIUM FOR CAPTURING LANDMARKS

BACKGROUND

The present disclosure relates to a server, a client terminal, a system, and a storage medium.

In recent years, a digital camera that stores and preserves a subject image in a recording medium as a digital image signal has been widely used. A user directs a digital camera toward a subject, visually recognizes an image displayed on a viewfinder, and presses a shutter button at a given timing.

Here, JP 2008-131405A discloses an imaging device that displays the position of a face in an image including face(s) as a technology relating to such a digital camera.

In addition to display of the face of a subject (person) using the face recognition technology such as the technology described in JP 2008-131405A, an imaging device is proposed that focuses on the recognized face, or optimizes exposure of the face part. Further, a face preferential technology is proposed that automatically performs an image capturing operation by preferentially focusing on the face of a child, or a smiling face over the other recognized faces.

SUMMARY

Although each of the technologies described above achieves a preferential focus by specializing in the face of a subject (person) with the face recognition technology, a subject that a user desires to preferentially capture is not limited to a face. For example, it is possible that a user desires to preferentially capture an especially famous spot (landmark) including a natural object and an architecture.

Therefore, the present disclosure proposes a server, a client terminal, a system, and a storage medium that are novel and improved, and are capable of showing a landmark having high priority among subjects included in an angle of view.

According to an embodiment of the present disclosure, there is provided a server including a database configured to store position information and priority of a landmark, a reception unit configured to receive, from a client terminal, position information of the client terminal, and a transmission unit configured to transmit, to the client terminal, the position information of the landmark corresponding to the position information received by the reception unit, and the priority of the landmark. The reception unit receives position information of a subject captured by the client terminal. Based on the position information of the subject received by the reception unit, the server further includes a control unit configured to perform control in a manner that the priority of the landmark stored in the database is updated.

According to another embodiment of the present disclosure, there is provided a client terminal including a transmission unit configured to transmit, to a server, position information of the client terminal, a reception unit configured to receive, from the server, position information and priority of a landmark positioned near a position of the client terminal indicated in the position information, and a control unit configured to perform display control on an indicator indicative of a particular subject in an angle of view based on the position information and the priority of the landmark that are received from the server.

According to the embodiments of the present disclosure described above, there is provided a system including a database configured to store position information and priority of a landmark, and a control unit configured to perform display control on an indicator indicative of a particular subject in an angle of view based on the position information of the landmark corresponding to position information of a client terminal, and the priority of the landmark. The control unit performs control based on position information of a subject captured by the client terminal in a manner that the priority of the landmark stored in the database is updated.

According to the embodiments of the present disclosure described above, there is provided a storage medium having a program stored therein, the program causing a computer to execute receiving, from a client terminal, position information of the client terminal, transmitting, to the client terminal, position information of a landmark corresponding to the position information received in the receiving step, and priority of the landmark, receiving position information of a subject captured by the client terminal, and performing control based on the position information of the subject in a manner that the priority of the landmark stored in a database is updated.

According to the embodiments of the present disclosure described above, there is provided a storage medium having a program stored therein, the program causing a computer to execute transmitting, to a server, position information of a client terminal, receiving, from the server, position information and priority of a landmark positioned near a position of the client terminal that is indicated in the position information, and performing display control on an indicator indicative of a particular subject in an angle of view based on the position information and the priority of the landmark received from the server.

According to the embodiments of the present disclosure described above, it is possible to indicate the landmark having high priority among subjects included in the angle of view.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram for describing an overview of an imaging system in accordance with an embodiment of the present disclosure;

FIG. **2** is a block diagram illustrating a configuration of a digital camera in accordance with the present embodiment;

FIG. **3** is a block diagram illustrating a configuration of a server in accordance with the present embodiment;

FIG. **4** is a diagram illustrating an example of data including priority that the server in accordance with the present embodiment transmits to the digital camera;

FIG. **5** is a flowchart illustrating an operation process in accordance with the present embodiment;

FIG. **6** is a diagram illustrating an example of a display screen that shows a landmark (famous spot) having high priority in accordance with the present embodiment;

FIG. **7** is a diagram for describing transmission of an operation history in accordance with the present embodiment; and

FIG. **8** is a diagram for describing an example in which famous spots are sequentially shown in accordance with the present embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENT(S)

Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the appended drawings. Note that, in this specification and the appended drawings, structural elements that have substantially the same function and structure are denoted with the same reference numerals, and repeated explanation of these structural elements is omitted.

Embodiments of the present disclosure will be described in the following order.

1. Overview of Imaging System in Accordance with Embodiment of Present Disclosure
2. Basic Configurations
2-1. Configuration of Digital Camera
2-2. Configuration of Server
3. Operation Process
4. Conclusion

<1. Overview of Imaging System in Accordance with Embodiment of Present Disclosure>

First, an overview of an imaging system in accordance with an embodiment of the present disclosure will be described with reference to FIG. **1**. As illustrated in FIG. **1**, the imaging system in accordance with the embodiment of the present disclosure includes a digital camera **1**, which is an example of a client terminal, and a server **3**. The digital camera **1** and the server **3** can be connected via a network **4**.

As illustrated in FIG. **1**, the digital camera **1** in accordance with the present embodiment displays a captured image (real image **40**) obtained by capturing a real space on a viewfinder (display unit **21**). The digital camera **1** transmits, to the server **3**, the position information, the image capturing direction, or the like of the digital camera **1**. The server **3** retrieves a famous spot (landmark) near the digital camera **1**, and transmits the data including priority of each famous spot to the digital camera **1**.

Then, the digital camera **1** performs display control based on the data including priority of each famous spot that has been received from the server **3** such that a famous spot having high priority among the respective famous spots shown in the real image **40** is displayed. In the present specification, the priority is an index for indicating a particular landmark among respective landmarks (subjects) in the angle of view.

More specifically, as illustrated in FIG. **1**, for example, when the real image **40** includes subjects **41**, **43**, and **45**, the digital camera **1** adjusts a degree of focus and focuses on a famous spot (subject **41**, for example) having high priority among the recognized subjects. The digital camera **1** may also superimpose a marker **42** indicative of the position of the recognized subject **41** on the real image **40**. Further, the digital camera **1** may superimpose the name "AA tower" of the subject **41** on the real image **40**.

In this way, the digital camera **1** in accordance with the present embodiment informs a user of a famous spot having high priority. Therefore, a user can intuitively recognize which of the subjects shown in the real image **40** is a famous spot.

The priority of each famous spot (landmark) may be determined based on, for example, statistical data including an operation history of each user that is collected in the server **3**. For example, subjects that a lot of users have focused on and captured are registered in the server **3** as landmarks. Further, the priority of the landmarks is updated in accordance with statistics on the number of times of image-capturing.

The basic configurations of the digital camera **1** and server **3** included in the imaging system, and an operation process of the imaging system in accordance with the present embodiment will be specifically described below. It is noted that although the digital camera **1** is shown as a client terminal in the present embodiment, a client terminal in accordance with an embodiment of the present disclosure is not limited thereto. For example, a client terminal in accordance with the present embodiment may be a video camera, a smartphone having a camera, personal digital assistants (PDA), a personal computer (PC), a mobile phone, a portable music player, a portable image processing device, a portable video game device, a telescope, binoculars, or the like.

A client terminal in accordance with the present embodiment is not limited to a device having a camera, and is applicable to a device capable of acquiring the position information and the direction information of the device, such as a device having a GPS or a direction sensor, for example. Further, a client terminal in accordance with the present embodiment is applicable to a device to which the position information and the direction information of the device can be manually input, even though the device that does not have a GPS or a direction sensor.

<2. Basic Configurations>

[2-1. Configuration of Digital Camera]

FIG. **2** is a block diagram illustrating a configuration of the digital camera **1** in accordance with the present embodiment. As illustrated in FIG. **2**, the digital camera **1** includes a CPU **10**, ROM **11**, RAM **12**, a direction sensor **13**, a GPS measurement unit **14**, a camera module **15**, an operation input unit **16**, an image recognition unit **18**, captured image memory **19**, a display control unit **20**, a display unit **21**, a network interface (I/F) **22**, and a clock unit **23**. Each configuration will be described below.

The direction sensor **13** detects a direction of an optical axis of lens optics, namely, an image capturing direction, of the camera module **15**, and outputs information (direction information) regarding the detected image capturing direction. It is noted that although the digital camera **1** having the camera module **15** is used herein as an example of a client terminal, as discussed above, a client terminal in accordance with the present embodiment is not limited to a device having a camera. When a client terminal does not have any camera, the direction sensor **13** may output, as direction information, the direction in which a particular portion of the client terminal faces. Additionally, the direction sensor **13** may be realized as an acceleration sensor, a geomagnetic sensor, or the like.

The GPS (Global Positioning System) measurement unit **14** receives a radio wave from a GPS satellite, detects a position at which the digital camera **1** is present, and outputs the detected position information. It is noted that the GPS measurement unit **14** is an example of a position information acquisition unit that detects the position of the digital camera **1** based on an external acquired signal. In addition, the position information acquisition unit may detect the position by performing transmission to, reception from, or near field communication with WiFi, a mobile phone, a PHS, a smartphone, or the like, for example.

The camera module **15** includes an image sensor, an imaging optics including an imaging lens, and a captured image signal processing unit, and outputs data of a captured image in the form of a digital signal. It is noted that an image sensor is realized as, for example, a CCD (Charge Coupled Device) imager or a CMOS (Complementary Metal Oxide Semiconductor) imager.

The operation input unit **16** is a shutter button, a zoom dial, a group of physical keys including various types of switches, a touch panel provided by being laminated on the display unit **21**, or the like for detecting a camera operation performed by a user. The CPU **10** performs a process in response to the user operation input from the operation input unit **16** in accordance with a program stored in the ROM **11**.

The image recognition unit **18** has a function of recognizing a subject (object) included in a real image. Here, the image recognition unit **18** may use recognition information (including a recognizer, recognition pattern data, recognition dictionary data, or dedicated recognition algorithm) in accor-

dance with a type of a target to be recognized. The image recognition unit **18** in accordance with the present embodiment may switch, as necessary, recognition information to be used. For example, the recognition information may be recognition information for recognizing a building when the digital camera **1** is located in a district where a lot of large buildings are present, or recognition information for recognizing a temple when a famous spot included in a real image is a temple.

Additionally, the recognition information used when the image recognition unit **18** recognizes a subject may be transmitted from the server **3**. As discussed below, the server **3** transmits the recognition information for recognizing a landmark along with the position information and the priority of the landmark.

When a plurality of dedicated recognition algorithm, dedicated recognition dictionary data, and the like are stored in the ROM **11** in advance, the image recognition unit **18** may switch the recognition information to be used in accordance with a recognition switching parameter transmitted from the server **3**.

For example, flash memory such as card type memory is used for the captured image memory **19**. Alternatively, the captured image memory **19** may be a recoding medium such as a DVD (Digital Versatile Disc). Further, the captured image memory **19** does not have to be such a removal memory medium, and may be a hard disc device.

The captured image memory **19** may store, as captured images, images of a subject that are successively output from the camera module **15** in accordance with the operation timing of the shutter button. At that timing, the captured image memory **19** may store, as image capturing time, the time information output from the clock unit **23** when the shutter button is operated (image is captured) in association with the captured image.

Additionally, the captured image memory **19** may store position information output from the GPS measurement unit **14**, and an image capturing direction output from the direction sensor **13** when the shutter button is operated (image is captured) in association with the captured image. Further, the captured image memory **19** may store an operation history (regarding which subject in the captured image is focused on, zoomed on, or the like) output from the operation input unit **16** and the camera module **15** in association with the captured image.

The CPU **10** (main control unit) controls each configuration of the digital camera **1**. The CPU **10** in accordance with the present embodiment performs control based on data including priority that includes the priority and the position information received from the server **3** such that a subject having higher priority among subjects in the angle of view is indicated in the subject images output from the camera module **15**. For example, the CPU **10** may automatically set an image capturing parameter of the camera module **15**. The image capturing parameter is a parameter or the like for adjusting, for example, a degree of focus, white balance, or exposure. Accordingly, the CPU **10** can focus on a subject having high priority, and can adjust white balance or exposure.

In addition to a program for performing an image capturing function, the ROM **11** stores programs or the like for performing an image recognition process, for automatically setting an image capturing parameter in accordance with the priority of a landmark, and for performing a display control process. Additionally, the CPU **10** executes the programs stored in the ROM **11** using the RAM **12** as a work area.

The display control unit **20** performs display control on display contents of a display screen that is displayed on the display unit **21** in accordance with control of the CPU **10** based on the programs stored in the ROM **11**. The display control unit **20** in accordance with the present embodiment may perform control based on data including priority that includes the priority and the position information of a landmark received from the server **3** such that an indicator indicative of a particular subject among subjects shown in an image (in an angle of view) recognized by the image recognition unit **18** is displayed. Accordingly, the display control unit **20** can explicitly indicate a subject having high priority (namely, a famous spot).

The display control unit **20** controls display of the display unit **21** included in the digital camera **1** in the present embodiment. However, it is noted that a target apparatus to be controlled in accordance with the present embodiment is not limited to the display unit **21**, and the display control unit **20** may control, for example, display of an external display device connected to the digital camera **1**.

The display unit **21** displays an image (real image) of a subject output from the camera module **15** in real time in addition to a menu screen, various types of operation screens, or the like in accordance with control of the display control unit **20**, and displays a captured image stored in the captured image memory **19**. The display unit **21** is realized as, for example, an LCD (Liquid Crystal Display), an OLED (Organic Light-Emitting Diode), or the like.

Additionally, the display unit **21** in accordance with the present embodiment indicates a famous spot having high priority shown in a real image in accordance with control of the display control unit **20**. A display example of a specific famous spot displayed on the display unit **21** will be described in "3. Operation Process" below.

The network I/F **22** is a communication module for transmitting data to and receiving data from an external device. For example, the network I/F **22** in accordance with the present embodiment is connected to the server **3** via the network **4**, and transmits, to the server **3**, position information, image capturing direction information, a captured image, an operation history, or the like. Here, the operation history is a camera operation history of a user output from, for example, the operation input unit **16** or the camera module **15**. More specifically, the operation history may be data indicating which subject in a captured image is focused on or zoomed on.

The network I/F **22** in accordance with the present embodiment also receives, from the server **3**, recognition information or the like that is necessary for recognizing the position information of a landmark, the priority of the landmark, and the landmark.

The configuration of the digital camera **1** in accordance with the first embodiment has been described in detail above. Next, the configuration of the server **3** in accordance with the present embodiment will be described with reference to FIG. **3**.

[2-2. Configuration of Server]

As illustrated in FIG. **3**, the server **3** includes a CPU **30**, ROM **31**, RAM **32**, a landmark database (DB) **33**, a determination unit **34**, a network interface (I/F) **35**, and an image recognition information database (DB) **36**. Each configuration will be described below.

(Landmark DB **33**)

The landmark DB **33** stores the position information and the priority associated with a landmark such as a famous spot. The priority may be acquired in advance from statistical data of, for example, an operation history (operation history including, for example, an operation of focusing or zooming)

of a user, or may be determined by the determination unit **34** in response to a request from the digital camera **1**.

Further, the priority may be independently set by a service provider. Accordingly, an owner of a landmark, or the like can make the priority of the landmark that he/she possesses higher at his/her expense.

The landmark DB **33** may store recommendation data of a landmark. In the present specification, the recommendation data of a landmark is recommendation data regarding image-capturing including a recommended time period and composition information when the landmark is captured, and a thumbnail of an image captured in the recommended time period and the composition. Here, the composition information is an example of a recommended image capturing condition, and the recommended image capturing condition also includes, for example, an image capturing parameter for controlling white balance, exposure, or the like.

The landmark DB **33** may store related information of a landmark. In the present specification, the related information of a landmark is the name, the explanation, or the like of the landmark.

The landmark DB **33** may store information indicative of another landmark related to the landmark. For example, as spots having a common topic, background, and history including each spot used for shooting a popular drama are related to each other, it is possible that a user successively uses the spots for image-capturing. The server **3** can also determine, actually based on statistical data of the operation history of each user, that a plurality of subjects captured in the same period by the users are related to each other, and can update the landmark DB **13**.

(Determination Unit **34**)

The determination unit **34** determines the priority of each landmark included in the angle of view of the digital camera **1** based on the position information and the image capturing direction of the digital camera **1**. For example, the determination unit **34** may retrieve a plurality of landmarks positioned near the digital camera **1** (in the angle of view, for example) from the landmark DB **33**, and may determine, as priority, a ranking with respect to a degree of famousness (attention) of each landmark based on the operation history (statistical data) of each landmark.

Here, the determination unit **34** may determine the priority of each landmark by assigning weight to the operation history. For example, the determination unit **34** may assign more weight to an operation history of a celebrity than that of an ordinary person.

The determination unit **34** may also determine priority in accordance with an attribute of a user. For example, the determination unit **34** may determine the priority of each landmark by assigning more weight to an operation history of a celebrity that the user likes.

(Image Recognition Information DB **36**)

The image recognition information DB **36** is recognition information that is necessary for recognizing a landmark included in an image. For example, the image recognition information DB **36** stores, as recognition information, a recognizer, recognition pattern data, recognition dictionary data, dedicated recognition algorithm, or the like. The image recognition information DB **36** may store a recognition switching parameter for switching to the recognition information necessary when the digital camera **1** has a plurality of recognition information.

(Network I/F **35**)

The network I/F **35** is a communication module for transmitting data to and receiving data from the digital camera **1** via the network **4**. The network I/F **35** in accordance with the present embodiment receives position information, image capturing direction information, a captured image, an operation history, or the like from the digital camera **1**.

Additionally, the network I/F **35** transmits the position information, the priority, the recommended data, and the like of a landmark in the angle of view to the digital camera **1**. A specific example of data including priority that the server **3** transmits to the digital camera **1** in this way will be described below.

The network I/F **35** may transmit recognition information for recognizing a landmark along with the position information and the priority of the landmark.

(CPU **30**, ROM **31**, and RAM **32**)

The CPU **30** controls each configuration of the server **3**. The CPU **30** in accordance with the present embodiment extracts (determines), based on the position information and the image capturing direction of the digital camera **1**, the position information, the priority, the recommendation data, and the like of each landmark included in the angle of view of the digital camera **1** from the landmark DB **33**.

The CPU **30** may extract the priority or the like of each landmark included in the angle of view based on the position information of the digital camera **1**, current time (including a date, time, and a season), or the like by using a method in accordance with a situation including statistics with respect to a location, time, and a combination thereof. In this way, by limiting a landmark to be extracted (determined) in accordance with a situation, it is possible to reduce a burden of an extraction process, or increase speed of an extraction process. The priority of a landmark may be priority that is determined by the determination unit **34**.

The CPU **30** extracts (determines), from the image recognition information DB **36**, recognition information that is necessary for recognizing a landmark included in the angle of view.

The CPU **30** further transmits, to the digital camera **1**, the recognition information including the position information, the priority, and the recommendation data of each landmark by controlling the network I/F **35**.

The ROM **31** stores software programs or the like for causing the CPU **30** to perform the extraction (determination) process, causing the determination unit **34** to perform the determination process of priority, and causing the network I/F **35** to transmit the data including priority of each landmark to the digital camera **1**, the processes of which have been described above. The CPU **30** executes the processes in accordance with the above-mentioned software programs stored in the ROM **31** by using the RAM **32** as a work area.

The configuration of the server **3** in accordance with the first embodiment has been described in detail above. Next, a specific example of data including priority that is transmitted from the server **3** to the digital camera **1** will be described with reference to FIG. **4**.

(Example of Data Including Priority)

FIG. **4** is a diagram illustrating an example of data including priority in accordance with the present embodiment. As illustrated in FIG. **4**, the server **3** transmits, to the digital camera **1**, data including priority that includes pieces of position information (P**1** to P**4**), priority, other related landmarks, recommendation data, and related information of each landmark included in the angle of view.

As discussed above, the priority is an index for indicating a particular landmark among the respective landmarks in the angle of view. In the example illustrated in FIG. **4**, the CPU **30** of the server **3** determines that landmarks L**1** to L**4** are included in the angle of view of the digital camera **1**, and extracts priority rankings **1** to **3** as the priority of those land-

marks. The priority rankings **1** to **4** may be priority determined by the determination unit **34** based on statistics regarding the operation history of each user for the landmarks L**1** to L**4**.

As discussed above, the other related landmarks are information (including, for example, position information, a name, and an explanation) indicative of other landmarks related to the landmark. In the example illustrated in FIG. **4**, for example, the landmark L**1** is related to the landmark L**3**, the landmark L**2** is related to the landmark L**1**, and the landmark L**3** is related to the landmark L**4**.

As discussed above, the recommendation data is a recommended image capturing time period, composition information, a thumbnail, or the like. In the example illustrated in FIG. **4**, for example, 13 o'clock to 17 o'clock is shown as the recommended image capturing time period for the landmark L**1**, and 18 o'clock to 20 o'clock is shown as the recommended image capturing time period for the landmark L**2**.

As discussed above, the related information is the name, the explanation, or the like of each landmark. In the example illustrated in FIG. **4**, for example, the name "BB temple" and the explanation of the landmark L**1**, and the name "AA tower" and the explanation of the landmark L**2** are shown.

The server **3** transmits such data including priority to the digital camera **1**. The digital camera **1** performs display control based on the received data including priority.

The basic configurations of the digital camera **1** and the server **3** included in the imaging system in accordance with the present embodiment have been described in detail above. Next, the operation process of the imaging system in accordance with the present embodiment will be specifically described.

<3. Operation Process>

FIG. **5** is a flowchart illustrating an operation process in accordance with the present embodiment. As illustrated in FIG. **5**, first, in step S**100**, the display control unit **20** of the digital camera **1** causes the display unit **21** to display, in real time, a subject image output from the camera module **15**.

Next, in step S**103**, the CPU **10** acquires the position information of the digital camera **1** from the GPS measurement unit **14**, and the image capturing direction from the direction sensor **13**.

Then, in step S**106**, the digital camera **1** transmits, to the server **3**, the image capturing information including the position information and the image capturing direction. The digital camera **1** may further transmit, as image capturing information, the angle of view (zoom proportion) calculated from an image capturing parameter output from the camera module **15**.

Next, in step S**109**, the server **3** retrieves the priority of a famous spot (landmark) included in the angle of view with reference to the landmark DB **33** based on the image capturing information received from the digital camera **1**.

Next, in step S**112**, the server **3** transmits the retrieved data including priority (see FIG. **4**) to the digital camera **1**.

Then, in step S**115**, the digital camera **1** performs control based on the data including priority received from the server **3** such that a landmark having high priority among recognized subjects is indicated. More specifically, for example, the digital camera **1** may automatically set an image capturing parameter such that a landmark having high priority is focused on. The digital camera **1** may automatically zoom, automatically adjust white balance or exposure, or the like as automatic setting of the image capturing parameter.

Alternatively, the digital camera **1** may perform display control on an indicator indicative of a landmark having high priority among recognized subjects.

Here, an example of a display screen showing a landmark (famous spot) having high priority will be described with reference to FIG. **6**. As illustrated in FIG. **6**, the digital camera **1** performs display control such that a subject **41** (landmark L**1**) having high priority that is a recognized subject among subjects shown in a real image **40** is surrounded with a marker **42**. Further, the digital camera **1** automatically sets an image capturing parameter so as to focus on the subject **41**.

As illustrated in FIG. **6**, the digital camera **1** may also superimpose a display column **46** showing the name and the explanation on the real image **40** based on the related information of the subject **41** (landmark L**1**) that is included in the data including priority. A timing at which the display column **46** is displayed may be a timing at which a particular subject is focused on or captured, the composition is decided, or the like.

Further, the digital camera **1** may perform control based on the recommendation data that is included in the data including priority such that an example of a recommended composition or a recommended image capturing time period for the subject **41** is displayed on the display unit **21**. Here, the digital camera **1** may show the example of the recommended composition or the recommended image capturing time period in the form of text data, or as illustrated in FIG. **6**, in the form of a thumbnail **47** of an image captured in the recommended composition or a thumbnail **49** of an image captured in the recommended image capturing time period.

The digital camera **1** may also perform display control such that based on the rule of thirds, for example, two horizontal lines and two vertical lines are superimposed at equal intervals on the real image **40** and the display screen of the display unit **21** is divided into nine equal parts, which may be used as an example of a recommended composition.

Therefore, a user can intuitively understand which is a famous spot among the subjects shown in the real image **40**, and capture a famous subject (famous spot) that is captured by a lot of people.

The name and the explanation of the famous spot are also displayed so that the utility of the digital camera **1** is improved.

Since examples of a recommended composition and a time period are displayed as recommendation data for capturing a famous spot, a user can take a better picture by referring thereto.

Next, returning to FIG. **5**, the operation process in accordance with the present embodiment is described again. In next steps S**118** to S**124**, the priority in the landmark DB **33** of the server **3** is updated based on a history of an operation actually performed by a user.

Specifically, in step S**118**, the operation input unit **16** of the digital camera **1** detects an operation including touch focus and an image capturing operation performed by a user.

Then, in step S**121**, the digital camera **1** transmits, to the server **3**, the operation detected by the operation input unit **16** as an operation history. At that time, the digital camera **1** may also transmit, to the server **3**: a captured image; the position information (image capturing position), the image capturing direction, and the image capturing date and time information associated with the captured image; and the position information of a target subject to be captured (to be focused on, or the like). The digital camera **1** may also transmit, to the server **3**, an image capturing parameter at the time of image-capturing.

Here, it is possible that a user pays attention to and captures a subject other than a particular subject that has high priority and is indicated by the digital camera **1** based on data including priority. For example, as illustrated in FIG. **7**, even if a

subject **41** having high priority is surrounded with a marker **42**, and explicitly designated as a famous spot, a user sometimes desires to capture another subject **43** shown in a real image **40**. In such a case, the user performs a touch focus operation on the subject **43** shown in the real image **40**, focuses on the subject **43**, and performs an image capturing operation. Then, the digital camera **1** transmits such an operation history (the digital camera **1** focuses on the subject **43** in accordance with the user operation and performs image-capturing) to the server **3**.

Next, in step **S124**, the server **3** updates the priority in the landmark DB **33** based on the operation history received from the digital camera **1**. More specifically, for example, information regarding which subject (spot) a user pays attention to (for example, focuses on) based on the operation history is used as statistical data of priority and is updated. The server **3** also stores, in the landmark DB **33**, other information received from the digital camera **1** that includes, for example, the captured image, the position information, the image capturing direction, or the image capturing date and time in association with a landmark corresponding to the subject to which attention is paid. When no landmark corresponding to the subject which attention is paid to (captured) is registered in the landmark DB **33**, the server **3** may register a subject to which attention is paid as a new landmark.

The server **3** may also receive a plurality of operation histories, captured images, and the like from the digital camera **1**, grasp a subject (spot) captured by a user in the same period, and update a relationship of each spot with another spot.

In this way, the server **3** can update the priority or the like of a famous spot stored in the landmark DB **33** based on the operation history of each user.

The operation process of the imaging system in accordance with the present embodiment has been described in detail above. In automatically setting the image capturing parameter based on the priority in step **S115**, the digital camera **1** may sequentially display particular landmarks in response to a user operation. The description thereof will be specifically made with reference to FIG. **8** below.

FIG. **8** is a diagram for describing an example in which famous spots (landmarks) are sequentially showed in accordance with the present embodiment. As illustrated in FIG. **8**, a real image **40** includes subjects **41**, **43**, and **45**.

Here, as displayed by a display screen **51** of FIG. **8**, the digital camera **1** focuses on the subject **41**, which has the highest priority out of the subjects **41**, **43**, and **45**, based on the data including priority received from the server **3**. In this case, when a user performs the touch focus operation on the subject **43**, as illustrated in a display screen **52**, the digital camera **1** surrounds the recognized subject **43** with a marker **44**, and performs control to focus on the subject **43**. Further, the digital camera **1** may display the name "BB temple," or the like of the subject **43** based on the data including priority.

After the user focuses on and captures the subject **43**, as illustrated in a display screen **53** of FIG. **8**, the digital camera **1** recognizes and focuses on the next subject **45** based on the data including priority. Here, the next subject **45** that is recognized by the digital camera **1** is another landmark related to the subject **43**, which a user just previously paid attention to and captured. As discussed above, the data including priority includes information indicative of another landmark that is related to the landmark. Since it is possible that the user successively captures the other related landmark, the digital camera **1** automatically sets an image capturing parameter so as to focus on the other related landmark.

In this way, the digital camera **1** in accordance with the present embodiment is capable of sequentially displaying particular subjects in a real image in response to the data including priority and a user operation.

<4. Conclusion>

As discussed above, the imaging system in accordance with the present embodiment performs control based on the priority of each famous spot (landmark) such that a subject having high priority among respective subjects in the angle of view is indicated. Accordingly, since a user can be informed of a famous spot having high priority in the present embodiment, the user can intuitively recognize which of subjects in the angle of view is a famous spot.

It should be understood by those skilled in the art that various modifications, combinations, sub-combinations and alterations may occur depending on design requirements and other factors insofar as they are within the scope of the appended claims or the equivalents thereof.

For example, in the embodiment described above, the server has the landmark DB **33**, and extracts the data including priority of each landmark in the angle of view. However, the embodiment of the present disclosure is not limited thereto. For example, in the embodiment of the present disclosure, a client terminal may have the landmark DB **33**, and may extract the data including priority of each landmark (subject) in the angle of view.

In the embodiment described above, an example of displaying recommended composition information in the form of text data and a thumbnail has been described. However, the display of the recommended composition in accordance with the present embodiment is not limited thereto. For example, when the digital camera **1** is located on an auxiliary device (tripod, desktop, or the like) capable of automatically adjusting the angle, the image capturing direction, the zoom, or the like, the digital camera **1** may output the recommended composition information (including the angle, the direction, and the zoom) to the auxiliary device. The digital camera **1** may be moved by the auxiliary device, and the direction and the angle may be adjusted, so that a real image in the recommended composition may be displayed on the display unit **21**.

In the embodiment described above, as illustrated in FIG. **1**, the subject **41** having high priority among the recognized subjects in the real image is surrounded with the marker **42**, but a way of indicating a particular subject (landmark) in accordance with the present embodiment is not limited thereto. For example, when a subject having high priority is small on the screen, an arrow may be used that indicates the subject.

Additionally, the present technology may also be configured as below.

(1) A server including:

a database configured to store position information and priority of a landmark;

a reception unit configured to receive, from a client terminal, position information of the client terminal; and

a transmission unit configured to transmit, to the client terminal, the position information of the landmark corresponding to the position information received by the reception unit, and the priority of the landmark,

wherein the reception unit receives position information of a subject captured by the client terminal, and

wherein, based on the position information of the subject received by the reception unit, the server further includes a control unit configured to perform control in a manner that the priority of the landmark stored in the database is updated.

(2) The server according to (1),

wherein the reception unit receives an operation history of the client terminal in which an image capturing parameter has been automatically set based on the position information and the priority of the landmark, and

wherein the control unit updates the priority stored in the database based on the operation history received by the reception unit.

(3) The server according to (1) or (2), wherein the server collects statistical data of the operation history stored in the database, and further comprises a determination unit configured to determine priority of a landmark included in an angle of view of the client terminal.

(4) The server according to any one of (1) to (3), wherein the subject captured by the client terminal is a subject for which the priority of the landmark has been set.

(5) The server according to (2), wherein the image capturing parameter is a parameter for adjusting a degree of focus, white balance, or exposure.

(6) The server according to any one of (1) to (5), wherein the database further stores a recommended image capturing time period of the landmark.

(7) The server according to any one of (1) to (6), wherein the database further stores a recommended image capturing condition of the landmark.

(8) A client terminal including:

a transmission unit configured to transmit, to a server, position information of the client terminal;

a reception unit configured to receive, from the server, position information and priority of a landmark positioned near a position of the client terminal indicated in the position information; and

a control unit configured to perform display control on an indicator indicative of a particular subject in an angle of view based on the position information and the priority of the landmark that are received from the server.

(9) The client terminal according to (8), wherein the transmission unit transmits, to the server, an operation history of a user after the control unit performs the display control on the indicator indicative of the particular subject in the angle of view based on the position information and the priority.

(10) The client terminal according to (8) or (9), wherein the transmission unit transmits, to the server, position information of a subject captured by an imaging unit.

(11) The client terminal according to (8) or (9), wherein, when a subject is captured, on which a focus adjustment, a white balance adjustment, or an exposure adjustment is performed based on the position information and the priority received from the server, the transmission unit transmits, to the server, position information of the subject.

(12) The client terminal according to any one of (8) to (11), wherein the control unit performs control based on the position information and the priority received from the server in a manner that an image capturing parameter of an imaging unit is automatically set.

(13) A system including:

a database configured to store position information and priority of a landmark; and

a control unit configured to perform display control on an indicator indicative of a particular subject in an angle of view based on the position information of the landmark corresponding to position information of a client terminal, and the priority of the landmark,

wherein the control unit performs control based on position information of a subject captured by the client terminal in a manner that the priority of the landmark stored in the database is updated.

(14) A storage medium having a program stored therein, the program causing a computer to execute:

receiving, from a client terminal, position information of the client terminal;

transmitting, to the client terminal, position information of a landmark corresponding to the position information received in the receiving step, and priority of the landmark;

receiving position information of a subject captured by the client terminal; and

performing control based on the position information of the subject in a manner that the priority of the landmark stored in a database is updated.

(15) A storage medium having a program stored therein, the program causing a computer to execute:

transmitting, to a server, position information of a client terminal;

receiving, from the server, position information and priority of a landmark positioned near a position of the client terminal that is indicated in the position information; and

performing display control on an indicator indicative of a particular subject in an angle of view based on the position information and the priority of the landmark received from the server.

The present disclosure contains subject matter related to that disclosed in Japanese Priority Patent Application JP 2012-071338 filed in the Japan Patent Office on Mar. 27, 2012, the entire content of which is hereby incorporated by reference.

What is claimed is:

1. A server comprising:

a database configured to store position information and priority of a plurality of landmarks;

a reception unit configured to receive, from a client terminal, position information of the client terminal, wherein the reception unit receives an operation history of the client terminal in which an image capturing parameter has been automatically set based on the position information and the priority of the plurality of landmarks;

a transmission unit configured to transmit, to the client terminal, the position information and the priority of the plurality of landmarks corresponding to the position information received by the reception unit,

wherein the priority of the plurality of landmarks is based on a current time, and

wherein the reception unit receives position information of a subject captured by the client terminal; and

a control unit configured to perform control in a manner that the priority of the plurality of landmarks stored in the database is updated based on the position information of the subject received by the reception unit, and wherein the control unit updates the priority of the plurality of landmarks stored in the database based on the operation history received by the reception unit.

2. The server according to claim **1**, wherein the server collects statistical data of an operation history of the client terminal stored in the database, and further comprises a determination unit configured to determine priority of a landmark included in an angle of view of the client terminal.

3. The server according to claim **1**, wherein the subject captured by the client terminal is a landmark of the plurality of landmarks for which the priority has been set.

4. The server according to claim **1**, wherein the image capturing parameter is a parameter for adjusting a degree of focus, white balance, or exposure.

5. The server according to claim **1**, wherein the database is configured to store a recommended image capturing time period of each of the plurality of landmarks.

6. The server according to claim 1, wherein the database is configured to store a recommended image capturing condition of each of the plurality of landmarks.

7. The server according to claim 1, wherein the priority of the plurality of landmarks is set by a service provider.

8. The server according to claim 1, further comprises a determination unit configured to determine the priority of each of the plurality of landmarks based on operation history of the client terminal.

9. The server according to claim 8, wherein the determination unit is configured to determine the priority of each of the plurality of landmarks by assigning a weight to the operation history.

10. The server according to claim 1, wherein the priority of each of the plurality of landmarks is based on the position information of the client terminal.

11. A client terminal comprising:

a transmission unit configured to transmit, to a server, position information of the client terminal, position information of a subject captured by the client terminal, and operation history of the client terminal in which an image capturing parameter has been automatically set based on position information and priority of a plurality of landmarks;

a reception unit configured to receive from the server, based on the position information of the client terminal, position information and priority of the plurality of landmarks

wherein the priority of the plurality of landmarks is based on a current time, and is updated at the server based on the operation history of the client terminal; and

a control unit configured to perform display control on an indicator indicative of the subject in an angle of view of the client terminal based on the position information and the priority of the plurality of landmarks received from the server.

12. The client terminal according to claim 11, wherein the transmission unit transmits, to the server, an operation history of a user of the client terminal after the control unit performs the display control on the indicator indicative of the subject in the angle of view based on the position information and the priority of the plurality of landmarks.

13. The client terminal according to claim 11, wherein the transmission unit transmits, to the server, position information of a subject captured by an imaging unit.

14. The client terminal according to claim 11, wherein, when a subject is captured, on which a focus adjustment, a white balance adjustment, or an exposure adjustment is performed based on the position information and the priority of the plurality of landmarks received from the server, the transmission unit transmits, to the server, position information of the subject.

15. The client terminal according to claim 11, wherein the control unit performs control based on the position information and the priority of the plurality of landmarks received from the server in a manner that an image capturing parameter of an imaging unit is automatically set.

16. The client terminal according to claim 11, further comprising an image recognition unit configured to recognize the subject based on recognition information stored in the client terminal, wherein the image recognition unit switches the recognition information based on a recognition switching parameter received from the server.

17. A system comprising:

a database configured to store position information and priority of a plurality of landmarks; and

a control unit configured to perform display control on an indicator indicative of a subject in an angle of view of a client terminal, based on the position information and the priority of landmarks corresponding to position information of the client terminal,

wherein the priority of the plurality of landmarks is based on a current time, and wherein the control unit performs control based on position information of the subject captured by the client terminal in a manner that the priority of the plurality of landmarks stored in the database is updated, and wherein the control unit updates the priority of the plurality of landmarks stored in the database based on operation history of the client terminal in which an image capturing parameter has been automatically set based on the position information and the priority of the plurality of landmarks.

18. A non-transitory computer-readable storage medium having a program stored therein, the program causing a computer to execute:

receiving, from a client terminal, position information of the client terminal and operation history of the client terminal in which an image capturing parameter has been automatically set based on the position information and priority of a plurality of landmarks;

transmitting, to the client terminal, position information and priority of the plurality of landmarks corresponding to the position information of the client terminal, received in the receiving step, and priority of the landmark;

wherein the priority of the plurality of landmarks is based on a current time;

receiving position information of a subject captured by the client terminal; and

performing control based on the position information of the subject in a manner that the priority of the plurality of landmarks stored in a database is updated, and wherein the control updates the priority of the plurality of landmarks stored in the database based on the operation history.

19. A non-transitory computer-readable storage medium having a program stored therein, the program causing a computer to execute:

transmitting, to a server, position information of a client terminal, position information of a subject captured by the client terminal, and operation history of the client terminal in which an image capturing parameter has been automatically set based on position information and priority of a plurality of landmarks;

receiving, from the server, based on the position information of the client terminal, position information and priority of the plurality of landmarks

wherein the priority of the plurality of landmarks is based on a current time, and is updated at the server based on the operation history of the client terminal; and

performing display control on an indicator indicative of the subject in an angle of view of the client terminal based on the position information and the priority of the plurality of landmarks received from the server.

* * * * *